simulate performance of the medical procedure with said associated medical instrument in accordance with said measured manipulation; and

a coupling mechanism for receiving said peripheral and operatively coupling said peripheral to said sensing assembly, wherein said coupling mechanism includes dimension adjustment means for automatically adjusting coupling mechanism dimensions in response to translational manipulation of said peripheral relative to said interface apparatus.

13. The apparatus of claim 12 wherein said sensing assembly includes:

a force feedback unit to apply force feedback to said peripheral in response to control signals from said simulation system.

14. The apparatus of claim 12 further including:

a mock anatomical site having an orifice for receiving said peripheral and providing access to said coupling mechanism; and

a pivoting mechanism to selectively pivot said mock anatomical site into a particular orientation to perform the medical procedure.

15. The apparatus of claim 12 further including:

a mock anatomical site having an orifice for receiving said peripheral;

a block of resilient material disposed between said mock anatomical site and said coupling mechanism; and

a guide tube extending from said orifice through said block to said coupling mechanism to guide said peripheral within said interface apparatus;

wherein said block provides resiliency to simulate forces and movement of said orifice encountered during performance of the medical procedure.

16. The apparatus of claim 15 wherein said resilient material includes foam.

17. The apparatus of claim 12 wherein said associated medical instrument includes an endoscope, and said medical procedure is an endoscopic procedure.

18. The apparatus of claim 17 wherein said peripheral is in the form of an endoscope and includes:

a working channel;

a working channel peripheral selectively manipulable by the user and associated with a working channel tool; and

a sensor to measure manipulation of said working channel peripheral and transmit information associated with said working channel peripheral manipulation to the simulation system to enable the simulation system to simulate performance of the medical procedure with said associated working channel tool in accordance with said working channel peripheral manipulation.

19. The apparatus of claim 18 wherein said peripheral further includes a working channel force feedback unit to apply force feedback to said working channel peripheral.

20. The apparatus of claim 17 wherein said peripheral is in the form of an endoscope and includes:

a navigation tube for insertion into the interface apparatus to traverse the simulated anatomy of the virtual patient, wherein a distal end of said navigation tube is associated with a camera;

a tube position peripheral selectively manipulable by the user and associated with the distal end of said navigation tube; and

a sensor to measure manipulation of said tube position peripheral and transmit information associated with said tube position peripheral manipulation to the simulation system to enable the simulation system to simulate flexing of said navigation tube distal end and positioning of said camera within the simulated anatomy during performance of the medical procedure in accordance with said tube position peripheral manipulation.

21. The apparatus of claim 12 wherein:

said medical procedure is an interventional radiology procedure;

said peripheral includes a plurality of nested instruments each selectively manipulable by the user and associated with a corresponding medical instrument;

said apparatus further includes a plurality of said coupling mechanisms to operatively couple said nested instruments to said sensing assembly; and

said sensing assembly includes peripheral sensing means for measuring manipulation of each nested instrument within the simulated anatomy and providing information associated with said nested instrument manipulation to the simulation system to enable the simulation system to simulate

performance of the medical procedure with said corresponding medical instruments in accordance with said nested instrument manipulation.

22. The apparatus of claim 12 further including a plurality of peripherals each selectively manipulable by the user and associated with a corresponding medical instrument and a plurality of said coupling mechanisms to operatively couple said plurality of peripherals to said sensing assembly;

wherein said sensing assembly includes peripheral sensing means for measuring manipulation of each peripheral within the simulated anatomy and providing information associated with manipulation of each said peripheral to the simulation system to enable the simulation system to simulate performance of the medical procedure with said associated medical instruments and exchange of said associated medical instruments during the medical procedure in accordance with said manipulation of said peripherals.

23. The apparatus of claim 13 further including a capture mechanism to engage a distalmost portion of said peripheral and operatively couple said peripheral to said sensing assembly.

24. The apparatus of claim 23 wherein said capture mechanism includes:

a disc attached to a proximal end of said dimension adjustment means;

a first annular washer disposed proximate and connected to said disc;

a second annular washer disposed toward a distal end of said capture mechanism;

a third annular washer disposed distally of and connected to said second annular washer for receiving said peripheral;

a tubular member disposed between said disc and said third annular washer, wherein a tubular member proximal end is disposed through said first annular washer and attached to said disc and a tubular member distal end is disposed through said second annular washer and attached to said third annular washer; and

a spring disposed between said first and second annular washers to elongate and compress said tubular member in response to translational manipulation of said peripheral relative to said interface apparatus to facilitate adjustment of tubular member cross-sectional dimensions;

wherein expansion of said spring in response to insertion of said peripheral within said interface apparatus elongates said tubular member, thereby decreasing said tubular member cross-sectional dimensions to engage said peripheral, and wherein compression of said spring in response to withdrawal of said peripheral from said interface apparatus compresses said tubular member, thereby increasing said tubular member cross-sectional dimensions to release said peripheral.

25. The apparatus of claim 24 wherein said tubular member includes a spirally wound material.

26. The apparatus of claim 23 wherein said capture mechanism is disposed within said sensing assembly and includes:

a peripheral interface having a plurality of jaws defined in a distal portion thereof to surround and engage said peripheral;

a spring disposed over said peripheral interface to bias said jaws to a normally closed state;

an expander disposed proximate said spring and having a conical distal end to manipulate said jaws to enter open and closed states; and

a pivotable actuator disposed proximate said expander to manipulate said expander to overcome said spring bias and control actuation of said jaws for entry into said closed and open states for capturing and releasing said peripheral.

27. The apparatus of claim 26 wherein said capture mechanism further includes:

an automatic capture and release mechanism to automatically capture and release said peripheral.

28. The apparatus of claim 27 wherein said automatic capture and release mechanism includes:

a rod connected to said sensing assembly via a friction bracket;

a pivotable bracket disposed on said sensing assembly proximate said rod;

an actuator extension coupled to said pivotable actuator to control actuation of said jaws to capture and release said peripheral;

a support bracket disposed on said rod for manipulating said actuator extension to control actuation of said jaws;

a bracket spring disposed between said sensing assembly and said pivotable bracket to apply force to said pivotable bracket to pivot that bracket about said support bracket and manipulate said

actuator extension relative to said support bracket to control actuation of said jaws in response to insertion and withdrawal of said peripheral within said interface apparatus;

wherein said peripheral interface captures said peripheral in response to said actuator extension being forced against said support bracket by said pivotable bracket and said bracket spring and releases said peripheral in response to said actuator extension being forced away from said support bracket by said pivotable bracket and said bracket spring.

29. The apparatus of claim 28 wherein said peripheral includes a plurality of nested instruments each selectively manipulable by the user and associated with a corresponding medical instrument, and said interface apparatus further includes:

a plurality of said sensing assemblies, each including said capture mechanism and associated with a corresponding nested instrument for engaging and measuring manipulation of that nested instrument and providing information associated with manipulation of that nested instrument to the simulation system to enable the simulation system to simulate performance of the medical procedure with said corresponding medical instruments in accordance with said nested instrument manipulation; and

a plurality of coupling mechanisms each associated with a corresponding nested instrument for operatively coupling said corresponding nested instrument to a corresponding sensing assembly;

wherein said friction bracket of each said sensing assembly capture mechanism includes a selectively adjustable friction member to adjust frictional forces between that friction bracket and a corresponding capture mechanism rod to control resistance applied by that sensing assembly to translational motion of said corresponding nested instrument;

wherein said friction member simulates frictional forces encountered between nested instruments during performance of the medical procedure.

30. The apparatus of claim 23 wherein:

said dimension adjustment means includes an inner tubular member and an outer tubular member, wherein said inner tubular member is disposed within said outer tubular member and slides relative to said outer tubular member to automatically adjust said coupling mechanism dimensions in response to translational manipulation of said peripheral relative to said interface apparatus;

said capture mechanism is disposed at a proximal end of said inner tubular member to engage said peripheral; and

a distal end of said inner tubular member is attached to said sensing assembly, wherein said inner tubular member is manipulated in accordance with said peripheral manipulation and said sensing assembly measures said peripheral manipulation by measuring manipulation of said inner tubular member.

31. The apparatus of claim 30 further including first and second supports, wherein said sensing assembly includes:

first and second pulleys disposed on said first and second supports, respectively;

a belt disposed about and between said first and second pulleys;

a peripheral motion assembly attached to said belt and said inner tubular member distal end to facilitate measurement of manipulation of said inner tubular member to measure said peripheral manipulation, wherein said peripheral motion assembly is movable between said first and second

supports in response to translational manipulation of said peripheral relative to said interface apparatus and further includes a rotation sensor to measure rotational motion of said peripheral by measuring rotational motion of said inner tubular member; and

a translation sensor disposed proximate said first pulley to measure translational motion of said peripheral by measuring rotation of said first pulley, wherein said peripheral motion assembly manipulates said belt to rotate said first and second pulleys during movement between said first and second supports in response to said translational manipulation of said peripheral;

wherein said force feedback unit is disposed proximate said second pulley to apply force feedback to said peripheral in response to control signals from said simulation system by impeding rotation of said second pulley, wherein said second pulley applies a resistive force to said belt in response to said impeded rotation to impede translational motion of said peripheral motion assembly, and thereby impede translational motion of said peripheral.

32. The apparatus of claim 24 wherein said apparatus further includes bias means for biasing said capture mechanism to an open state to enable entry and release of said peripheral within said capture mechanism.

33. The apparatus of claim 32 further including first and second supports, wherein said sensing assembly is disposed between said first and second supports and said capture mechanism is disposed at a proximal end of said coupling mechanism, and wherein said bias means includes:

a first magnet attached to a distal portion of said coupling mechanism; and

a second magnet attached to said first support;

wherein attraction forces of said first and second magnets bias said spring to a compressed state to facilitate increased cross-sectional dimensions of said tubular member and entry and release of said peripheral within said capture mechanism.

34. The apparatus of claim 23 wherein said dimension adjustment means includes stabilization means for stabilizing said peripheral against buckling during manipulation of said peripheral within said interface apparatus to perform the medical procedure.

35. The apparatus of claim 34 wherein:

said stabilization means includes an inner tubular member and an outer tubular member, wherein said inner tubular member is disposed within said outer tubular member and slides relative to said outer tubular member to stabilize said peripheral against buckling and to automatically adjust said coupling mechanism dimensions in response to translational manipulation of said peripheral relative to said interface apparatus; and

a distal end of said inner tubular member is attached to said sensing assembly to operatively couple said peripheral to said sensing assembly.

36. The apparatus of claim 34 further including first and second supports, wherein said sensing assembly includes:

first and second pulleys disposed on said first and second supports, respectively;

a belt disposed about and between said first and second pulleys;

a peripheral motion assembly attached to said belt and said stabilization means to facilitate measurement of said peripheral manipulation and including said capture mechanism to engage said peripheral, wherein said peripheral motion assembly is movable between said first and second supports in response to translational manipulation of said peripheral relative to said interface apparatus and further includes a rotation sensor to measure rotational motion of said peripheral; and

a translation sensor disposed proximate said first pulley to measure translational motion of said peripheral by measuring rotation of said first pulley, wherein said peripheral motion assembly manipulates said belt to rotate said first and second pulleys during movement between said first and second supports in response to said translational manipulation of said peripheral;

wherein said force feedback unit is disposed proximate said second pulley to apply force feedback to said peripheral in response to control signals from said simulation system by impeding rotation of said second pulley, wherein said second pulley applies a resistive force to said belt in response to said impeded rotation to impede translational motion of said peripheral motion assembly, and thereby impede translational motion of said peripheral.

37. The apparatus of claim 34 wherein said dimension adjustment means includes a bellows and said stabilization means includes a series of openings defined in said bellows for receiving said peripheral and operatively coupling said peripheral to said sensing assembly.

38. The apparatus of claim 34 further including first and second supports, wherein said sensing assembly includes:

first and second pulleys disposed adjacent said first and second supports, respectively;

a belt disposed about and between said first and second pulleys; and

a peripheral motion assembly attached to said belt and including said capture mechanism to engage said peripheral, wherein said coupling mechanism is disposed between said peripheral motion assembly and said first support, and wherein said peripheral motion assembly is movable between said first and second supports in response to translational manipulation of said peripheral relative to said interface apparatus and further includes:

a rotation sensor to measure rotational motion of said peripheral; and

a translation sensor to measure translational motion of said peripheral;

wherein said force feedback unit is disposed proximate said first pulley to apply force feedback to said peripheral in response to control signals from said simulation system by impeding rotation of said first pulley, wherein said first pulley applies a resistive force to said belt in response to said impeded rotation to impede translational motion of said peripheral motion assembly, and thereby impede translational motion of said peripheral.

39. The apparatus of claim 34 wherein said peripheral includes a plurality of nested instruments each selectively manipulable by the user and associated with a corresponding medical instrument, and said interface apparatus further includes:

first and second supports;

a plurality of said sensing assemblies, each associated with a corresponding nested instrument for measuring manipulation of that nested instrument within the simulated anatomy and providing information associated with manipulation of that nested instrument to the simulation

system to enable the simulation system to simulate performance of the medical procedure with said corresponding medical instruments in accordance with said nested instrument manipulation;

a plurality of said coupling mechanisms each associated with a corresponding nested instrument for stabilizing said corresponding nested instrument against buckling and operatively coupling said corresponding nested instrument to a corresponding sensing assembly, wherein each said sensing assembly includes:

first and second pulleys disposed toward said first and second supports, respectively;

a belt disposed about and between said first and second pulleys;

a peripheral motion assembly attached to said belt and including said capture mechanism to engage a corresponding nested instrument, wherein said peripheral motion assembly is movable between said first and second supports in response to translational manipulation of said corresponding nested instrument relative to said interface apparatus and further includes:

a rotation sensor to measure rotational motion of said corresponding nested instrument; and

a translation sensor to measure translational motion of said corresponding nested instrument; and

a force feedback unit disposed proximate said first pulley to apply force feedback to said corresponding nested instrument in response to control signals from said simulation system by impeding rotation of said first pulley, wherein said first pulley applies a resistive force to said belt in response to said impeded rotation to impede translational motion of said

peripheral motion assembly, and thereby impede translational motion of said corresponding nested instrument;

wherein said peripheral motion assemblies are successively arranged between said first and second supports, and wherein each said capture mechanism is configured to capture a nested instrument of a particular dimension and permit lesser dimensioned instruments to extend through that peripheral motion assembly.

40. The apparatus of claim 34 further including:

first and second supports;

a plurality of independent peripherals each selectively manipulable by the user and associated with a corresponding medical instrument;

a plurality of said sensing assemblies each associated with a corresponding independent peripheral for measuring manipulation of said corresponding independent peripheral within the simulated anatomy and providing information associated with manipulation of that independent peripheral to the simulation system to enable the simulation system to simulate performance of the medical procedure with said corresponding medical instruments in accordance with said independent peripheral manipulation;

a plurality of said coupling mechanisms each associated with a corresponding independent peripheral for stabilizing said corresponding independent peripheral against buckling and operatively coupling said corresponding independent peripheral to a corresponding sensing assembly, wherein each said sensing assembly includes:

first and second pulleys disposed toward said first and second supports, respectively;

a belt disposed about and between said first and second pulleys;

a peripheral motion assembly attached to said belt and including said capture mechanism to engage said corresponding independent peripheral, wherein said peripheral motion assembly is movable between said first and second supports in response to translational manipulation of said corresponding independent peripheral relative to said interface apparatus and further includes:

a rotation sensor to measure rotational motion of said corresponding independent peripheral; and

a translation sensor to measure translational motion of said corresponding independent peripheral; and

a force feedback unit disposed proximate said first pulley to apply force feedback to said corresponding independent peripheral in response to control signals from said simulation system by impeding rotation of said first pulley, wherein said first pulley applies a resistive force to said belt in response to said impeded rotation to impede translational motion of said peripheral motion assembly, and thereby impede translational motion of said corresponding independent peripheral;

wherein said sensing assemblies are arranged in parallel relation within said interface apparatus to measure manipulation of said independent peripherals.

41. The apparatus of claim 40 wherein:

at least one of said independent peripherals includes a plurality of nested instruments with each nested instrument being selectively manipulable by the user and associated with a corresponding medical instrument;

a plurality of said sensing assemblies are associated with said at least one nested peripheral, wherein each nested peripheral sensing assembly is associated with a corresponding nested instrument to engage, provide force feedback to and measure manipulation of that nested instrument; and

a plurality of said coupling mechanisms are associated with said at least one nested peripheral with each associated coupling mechanism stabilizing a corresponding nested instrument against buckling and operatively coupling said corresponding nested instrument to a corresponding sensing assembly.

42. The apparatus of claim 40 further including:

a mock anatomical site having a plurality of orifices, wherein each said orifice is associated with a corresponding independent peripheral for receiving that peripheral;

a block of resilient material disposed between said mock anatomical site and said coupling mechanisms; and

a plurality of guide tubes each associated with a corresponding orifice and extending from that orifice through said block to a corresponding coupling mechanism to guide said independent peripheral associated with that orifice within said interface apparatus;

wherein said block provides resiliency to simulate forces and movement of said orifices encountered during performance of the medical procedure.

43. An interface apparatus for operatively interconnecting instruments to a simulation system to enable a user to interact with the simulation system to perform a medical procedure on a simulated anatomy of a virtual patient, said interface apparatus comprising:

a plurality of peripherals each selectively manipulable by the user and associated with a corresponding medical instrument; and

a plurality of sensing assemblies each associated with a corresponding peripheral for measuring manipulation of that peripheral within the simulated anatomy and providing information associated with manipulation of said corresponding peripheral to the simulation system to enable the simulation system to simulate performance of the medical procedure with said associated medical instruments and exchange of said associated medical instruments during the medical procedure in accordance with said manipulation of said peripherals.

44. An interface apparatus for operatively interconnecting instruments to a simulation system to enable a user to interact with the simulation system to perform a medical procedure on a simulated anatomy of a virtual patient, said interface apparatus comprising:

a peripheral selectively manipulable by the user and associated with a medical instrument;

a sensing assembly to measure manipulation of said peripheral and transmit information associated with said manipulation to the simulation system to enable the simulation system to simulate performance of the medical procedure with said associated medical instrument in accordance with said measured manipulation;

a mock anatomical site having an orifice for receiving said peripheral and providing access to said sensing assembly; and

a pivoting mechanism to selectively pivot said mock anatomical site into a particular orientation to perform the medical procedure.

45. An interface apparatus for operatively interconnecting instruments to a simulation system to enable a user to interact with the simulation system to perform a medical procedure on a simulated anatomy of a virtual patient, said interface apparatus comprising:

a peripheral selectively manipulable by the user and associated with a medical instrument;

a sensing assembly to measure manipulation of said peripheral and transmit information associated with said manipulation to the simulation system to enable the simulation system to simulate performance of the medical procedure with said associated medical instrument in accordance with said measured manipulation;

a mock anatomical site having an orifice for receiving said peripheral and providing access to said sensing assembly;

a block of resilient material disposed between said mock anatomical site and said sensing assembly; and

a guide tube extending from said orifice through said block toward said sensing assembly to guide said peripheral within said interface apparatus;

wherein said block provides resiliency to simulate forces and movement of said orifice encountered during performance of the medical procedure.

46. The apparatus of claim 45 wherein said resilient material includes foam.

47. An interface apparatus for operatively interconnecting instruments to a simulation system to enable a user to interact with the simulation system to perform a medical procedure on a simulated anatomy of a virtual patient, said interface apparatus comprising:

a peripheral having a plurality of nested instruments each selectively manipulable by the user and associated with a corresponding medical instrument;

a plurality of sensing assemblies each associated with a corresponding nested instrument for measuring manipulation of said corresponding nested instrument within the simulated anatomy and providing information associated with manipulation of that nested instrument to the simulation system to enable the simulation system to simulate performance of the medical procedure with said corresponding medical instruments in accordance with said nested instrument manipulation;

wherein each said sensing assembly includes a peripheral motion assembly including a capture mechanism to engage said corresponding nested instrument, and said peripheral motion assembly is movable in response to translational manipulation of said corresponding nested instrument relative to said interface apparatus and further includes:

a rotation sensor to measure rotational motion of said corresponding nested instrument; and

a translation sensor to measure translational motion of said corresponding nested instrument;

wherein said peripheral motion assemblies are successively arranged, and wherein each said capture mechanism is configured to capture a nested instrument of a particular dimension and permit lesser dimensioned instruments to extend through that peripheral motion assembly.

48. An interface apparatus for operatively interconnecting instruments to a simulation system to enable a user to interact with the simulation system to perform a medical procedure on a simulated anatomy of a virtual patient, said interface apparatus comprising:

a plurality of independent peripherals each selectively manipulable by the user and associated with a corresponding medical instrument;

a plurality of sensing assemblies each associated with a corresponding independent peripheral for measuring manipulation of said corresponding independent peripheral within the simulated anatomy and providing information associated with manipulation of that independent peripheral to the simulation system to enable the simulation system to simulate performance of the medical procedure with said corresponding medical instruments in accordance with said independent peripheral manipulation;

wherein each said sensing assembly includes a peripheral motion assembly including a capture mechanism to engage said corresponding independent peripheral, and said peripheral motion assembly is movable in response to translational manipulation of said corresponding independent peripheral relative to said interface apparatus and further includes:

a rotation sensor to measure rotational motion of said corresponding independent peripheral; and

a translation sensor to measure translational motion of said corresponding independent peripheral;

wherein said sensing assemblies are arranged in parallel relation within said interface apparatus to measure manipulation of said independent peripherals.

49. In an interface apparatus for operatively interconnecting a peripheral to a simulation system to enable a user to interact with the simulation system to perform a medical procedure on a simulated anatomy of a virtual patient, wherein said interface apparatus includes a sensing assembly to measure manipulation of said peripheral and transmit information associated with said manipulation to the simulation system and a coupling mechanism to operatively couple said peripheral to said sensing assembly, a capture mechanism to engage said peripheral comprising:

a tubular member disposed between proximal and distal ends of said capture mechanism for engaging said peripheral; and

a spring disposed between said proximal and distal ends of said capture mechanism and over said tubular member to elongate and compress said tubular member in response to translational manipulation of said peripheral relative to said interface apparatus to facilitate adjustment of tubular member cross-sectional dimensions;

wherein expansion of said spring in response to insertion of said peripheral within said interface apparatus elongates said tubular member, thereby decreasing said tubular member cross-sectional dimensions to engage said peripheral, and wherein compression of said spring in response to withdrawal of said peripheral from said interface apparatus compresses said tubular member, thereby increasing said tubular member cross-sectional dimensions to release said peripheral.

50. The mechanism of claim 49 further including:

a disc attached to a proximal end of said coupling mechanism;

a first annular washer disposed proximate and connected to said disc;

a second annular washer disposed toward said distal end of said capture mechanism; and

a third annular washer disposed distally of and connected to said second annular washer for receiving said peripheral;

wherein a tubular member proximal end is disposed through said first annular washer and attached to said disc and a tubular member distal end is disposed through said second annular washer and attached to said third annular washer;

wherein said spring is disposed between said first and second annular washers to elongate and compress said tubular member in response to translational manipulation of said peripheral relative to said interface apparatus to facilitate adjustment of tubular member cross-sectional dimensions.

51. The mechanism of claim 49 wherein said tubular member includes a spirally wound material.

52. In an interface apparatus for operatively interconnecting a peripheral to a simulation system to enable a user to interact with the simulation system to perform a medical procedure on a simulated anatomy of a virtual patient, wherein said interface apparatus includes a sensing assembly to measure manipulation of said peripheral and transmit information associated with said manipulation to the simulation system and a coupling mechanism to operatively couple said peripheral to said sensing assembly, a capture mechanism to engage said peripheral comprising:

a peripheral interface having a plurality of jaws defined in a distal portion thereof to surround and engage said peripheral;

a spring disposed over said peripheral interface to bias said jaws to a normally closed state;

an expander disposed proximate said spring and having a conical distal end to manipulate said jaws to enter open and closed states; and

a pivotable actuator disposed proximate said expander to manipulate said expander to overcome said spring bias and control actuation of said jaws for entry into said closed and open states for capturing and releasing said peripheral.

53. The mechanism of claim 52 further including an automatic capture and release mechanism to automatically capture and release said peripheral.

54. The mechanism of claim 53 wherein said automatic capture and release mechanism includes:

a rod connected to said sensing assembly via a friction bracket;

a pivotable bracket disposed on said sensing assembly proximate said rod;

an actuator extension coupled to said pivotable actuator to control actuation of said jaws to capture and release said peripheral;

a support bracket disposed on said rod for manipulating said actuator extension to control actuation of said jaws;

a bracket spring disposed between said sensing assembly and said pivotable bracket to apply force to said pivotable bracket to pivot that bracket about said support bracket and manipulate said actuator extension relative to said support bracket to control actuation of said jaws in response to insertion and withdrawal of said peripheral within said interface apparatus;

wherein said peripheral interface captures said peripheral in response to said actuator extension being forced against said support bracket by said pivotable bracket and said bracket spring and releases said peripheral in response to said actuator extension being forced away from said support bracket by said pivotable bracket and said bracket spring.

55. In an interface having a peripheral selectively manipulable by a user and associated with a medical instrument, a sensing assembly to measure manipulation of the peripheral and a coupling mechanism to operatively couple the peripheral to the sensing assembly, a method of enabling the user to interact with a simulation system via the interface to perform a medical procedure on a simulated anatomy of a virtual patient comprising the steps of:

(a) operatively coupling the peripheral to the sensing assembly via the coupling mechanism;

(b) automatically adjusting coupling mechanism dimensions in response to translational manipulation of the peripheral relative to the interface to facilitate measurement of peripheral manipulation;

(c) measuring manipulation of the peripheral via the sensing assembly; and

(d) transmitting information associated with the measured manipulation from the interface to the simulation system to enable the simulation system to simulate performance of the medical procedure with the associated medical instrument in accordance with the measured manipulation.

56. The method of claim 55 further including the step of:

(e) applying force feedback to the peripheral in response to control signals from the simulation system.

57. The method of claim 55 wherein the interface further includes a mock anatomical site having an orifice for receiving the peripheral and providing access to the coupling mechanism, and step (a) further includes:

(a.1) selectively pivoting the mock anatomical site into a particular orientation to perform the medical procedure.

58. The method of claim 55 wherein the interface further includes a mock anatomical site having an orifice for receiving the peripheral, a block of resilient material disposed between the mock anatomical site and the coupling mechanism and a guide tube to guide the peripheral within the interface, and step (a) further includes:

(a.1) simulating forces and movement of the orifice encountered during performance of the medical procedure by forming a resilient passage within the interface for the peripheral to traverse, wherein step (a.1) further includes:

(a.1.1) forming the resilient passage by positioning the guide tube within the interface to extend from the orifice through the block to the coupling mechanism.

59. The method of claim 55 wherein the associated medical instrument includes an endoscope, and the medical procedure is an endoscopic procedure.

60. The method of claim 59 wherein the peripheral is in the form of an endoscope and includes a working channel, a working channel peripheral selectively manipulable by the user and

associated with a working channel tool and a sensor to measure manipulation of the working channel peripheral, and step (c) further includes:

(c.1) measuring manipulation of the working channel peripheral via the sensor; and

step (d) further includes:

(d.1) transmitting information associated with the working channel peripheral manipulation to the simulation system to enable the simulation system to simulate performance of the medical procedure with the associated working channel tool in accordance with the working channel peripheral manipulation.

61. The method of claim 60 further including the step of:

(e) applying force feedback to the working channel peripheral.

62. The method of claim 59 wherein the peripheral is in the form of an endoscope and includes a navigation tube for insertion into the interface to traverse the simulated anatomy of the virtual patient, a tube position peripheral selectively manipulable by the user and associated with a distal end of the navigation tube and a sensor to measure manipulation of the tube position peripheral, wherein the distal end of the navigation tube is associated with a camera, and step (c) further includes:

(c.1) measuring manipulation of the tube position peripheral via the sensor; and

step (d) further includes:

(d.1) transmitting information associated with the tube position peripheral manipulation to the simulation system to enable the simulation system to simulate flexing of the navigation tube

distal end and positioning of the camera within the simulated anatomy during performance of the medical procedure in accordance with the tube position peripheral manipulation.

63. The method of claim 55 wherein the medical procedure is an interventional radiology procedure, the peripheral includes a plurality of nested instruments each selectively manipulable by the user and associated with a corresponding medical instrument, the interface further includes a plurality of said coupling mechanisms each associated with a corresponding nested instrument, and step (a) further includes:

(a.1) operatively coupling the nested instruments to the sensing assembly via the coupling mechanisms;

step (b) further includes:

(b.1) automatically adjusting dimensions of the coupling mechanisms in response to translational manipulation of the corresponding nested instruments to facilitate measurement of nested instrument manipulation;

step (c) further includes:

(c.1) measuring manipulation of each nested instrument within the simulated anatomy via the sensing assembly; and

step (d) further includes:

(d.1) transmitting information associated with the measured nested instrument manipulation to the simulation system to enable the simulation system to simulate performance of the medical procedure with the corresponding medical instruments in accordance with the nested instrument manipulation.

64. The method of claim 55 wherein the interface further includes a plurality of peripherals each selectively manipulable by the user and associated with a corresponding medical instrument and a plurality of said coupling mechanisms each associated with a corresponding peripheral, and step (a) further includes:

(a.1) operatively coupling the plurality of peripherals to the sensing assembly via the coupling mechanisms;

step (b) further includes:

(b.1) automatically adjusting dimensions of the coupling mechanisms in response to translational manipulation of the corresponding peripherals to facilitate measurement of peripheral manipulation;

step (c) further includes:

(c.1) measuring manipulation of each peripheral within the simulated anatomy via the sensing assembly; and

step (d) further includes:

(d.1) transmitting information associated with manipulation of each peripheral to the simulation system to enable the simulation system to simulate performance of the medical procedure with the associated medical instruments and exchange of the associated medical instruments during the medical procedure in accordance with the manipulation of the peripherals.

65. The method of claim 56 wherein the interface further includes a capture mechanism to engage the peripheral, and step (a) further includes:

(a.1) engaging a distalmost portion of the peripheral via the capture mechanism to operatively couple the peripheral to the sensing assembly.

66. The method of claim 65 wherein the capture mechanism includes a tubular member disposed between proximal and distal ends of the capture mechanism and a spring disposed over the tubular member to elongate and compress the tubular member, and step (a.1) includes:

(a.1.1) decreasing cross-sectional dimensions of the tubular member to engage the peripheral by expanding the spring in response to insertion of the peripheral within the interface; and

(a.1.2) increasing the tubular member cross-sectional dimensions to release the peripheral by compressing the spring in response to withdrawal of the peripheral from the interface.

67. The method of claim 65 wherein the capture mechanism is disposed within the sensing assembly and includes a peripheral interface having a plurality of jaws defined in a distal portion thereof to surround and engage the peripheral, a spring disposed over the peripheral interface, an expander having a conical distal end to manipulate the jaws, and a pivotable actuator to manipulate the expander to actuate the jaws, wherein step (a.1) further includes:

(a.1.1) biasing the jaws to a normally closed state via the spring; and

(a.1.2) manipulating the jaws to enter open and closed states for capturing and releasing the peripheral by manipulating the pivotable actuator to cause the expander to overcome the spring bias and control actuation of the jaws.

68. The method of claim 67 wherein the capture mechanism further includes an automatic capture and release mechanism to capture and release the peripheral, and step (a.1.2) further includes:

(a.1.2.1) automatically capturing and releasing the peripheral via the automatic capture and release mechanism.

69. The method of claim 68 wherein the automatic capture and release mechanism includes a rod connected to the sensing assembly via a friction bracket, a pivotable bracket disposed on the sensing assembly proximate the rod, an actuator extension coupled to the pivotable actuator to control actuation of the jaws, a support bracket disposed on the rod and a bracket spring disposed between the sensing assembly and the pivotable bracket, and step (a.1.2.1) further includes:

(a.1.2.1.1) pivoting the pivotable bracket about the support bracket to manipulate the actuator extension relative to the support bracket to control actuation of the jaws in response to insertion and withdrawal of the peripheral within the interface;

(a.1.2.1.2) capturing the peripheral in response to the actuator extension being forced against the support bracket during insertion of the peripheral within the interface; and

(a.1.2.1.3) releasing the peripheral in response to the actuator extension being forced away from the support bracket during withdrawal of the peripheral from the interface.

70. The method of claim 69 wherein the peripheral includes a plurality of nested instruments each selectively manipulable by the user and associated with a corresponding medical instrument, the interface further includes a plurality of said sensing assemblies each associated with a

corresponding nested instrument to measure manipulation of that nested instrument and a plurality of said coupling mechanisms each associated with a corresponding nested instrument to operatively couple that nested instrument to a corresponding sensing assembly, and wherein the friction bracket of each sensing assembly capture mechanism includes a selectively adjustable friction member, and step (a) further includes:

(a.2) operatively coupling the nested instruments to the corresponding sensing assemblies via the corresponding coupling mechanisms;

step (b) further includes:

(b.1) automatically adjusting the dimensions of the coupling mechanisms in response to translational manipulation of the corresponding nested instruments to facilitate measurement of nested instrument manipulation;

step (c) further includes:

(c.1) measuring manipulation of each nested instrument via the corresponding sensing assemblies; and

step (d) further includes:

(d.1) transmitting information associated with manipulation of the nested instruments to the simulation system to enable the simulation system to simulate performance of the medical procedure with the corresponding medical instruments in accordance with the nested instrument manipulation; and

(d.2) simulating frictional forces encountered between nested instruments during performance of the medical procedure by adjusting frictional forces between the friction bracket of

each sensing assembly and a corresponding capture mechanism rod to control resistance applied by that sensing assembly to translational motion of the corresponding nested instrument.

71. The method of claim 65 wherein the coupling mechanism includes an inner tubular member disposed within an outer tubular member, the capture mechanism is disposed at a proximal end of the inner tubular member to engage the peripheral, a distal end of the inner tubular member is attached to the sensing assembly, and step (b) further includes:

(b.1) automatically adjusting the coupling mechanism dimensions in response to translational manipulation of the peripheral relative to the interface by sliding the inner tubular member relative to the outer tubular member; and

step (c) further includes:

(c.1) measuring manipulation of the peripheral by measuring manipulation of the inner tubular member, wherein the inner tubular member is manipulated in accordance with manipulation of the peripheral.

72. The method of claim 65 wherein step (a.1) further includes:

(a.1.1) biasing the capture mechanism to an open state to enable entry and release of the peripheral within the capture mechanism.

73. The method of claim 65 wherein step (b) further includes:

(b.1) stabilizing the peripheral against buckling during manipulation of the peripheral within the interface to perform the medical procedure.

74. The method of claim 73 wherein the coupling mechanism includes an inner tubular member disposed within an outer tubular and a distal end of the inner tubular member is attached to the sensing assembly, and step (b.1) further includes:

(b.1.1) stabilizing the peripheral against buckling and automatically adjusting the coupling mechanism dimensions in response to translational manipulation of the peripheral relative to the interface by sliding the inner tubular member relative to the outer tubular member.

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75. The method of claim 65 wherein the interface further includes first and second supports, the sensing assembly includes first and second pulleys respectively disposed on the first and second supports, a belt disposed about and between the first and second pulleys and a peripheral motion assembly attached to the belt and coupled to the peripheral, wherein the peripheral motion assembly is movable between the first and second supports in response to translational manipulation of the peripheral relative to the interface, and step (c) further includes:

(c.1) measuring rotational motion of the peripheral; and

(c.2) measuring translational motion of the peripheral by measuring rotation of the first pulley, wherein the peripheral motion assembly manipulates the belt to rotate the first and second pulleys during movement between the first and second supports in response to translational manipulation of the peripheral; and

step (e) further includes:

(e.1) applying force feedback to the peripheral in response to control signals from the simulation system by impeding rotation of the second pulley, wherein the second pulley applies a

resistive force to the belt in response to the impeded rotation to impede translational motion of the peripheral motion assembly, and thereby impede translational motion of the peripheral.

76. The method of claim 65 wherein the interface further includes first and second supports, the sensing assembly includes first and second pulleys respectively disposed adjacent the first and second supports, a belt disposed about and between the first and second pulleys and a peripheral motion assembly attached to the belt and coupled to the peripheral, wherein the peripheral motion assembly is movable between the first and second supports in response to translational manipulation of the peripheral relative to the interface, and step (c) further includes:

(c.1) measuring rotational motion of the peripheral; and

(c.2) measuring translational motion of the peripheral by measuring translational motion of the peripheral motion assembly, wherein the peripheral motion assembly manipulates the belt to rotate the first and second pulleys during movement between the first and second supports in response to translational manipulation of the peripheral; and

step (e) further includes:

(e.1) applying force feedback to the peripheral in response to control signals from the simulation system by impeding rotation of the first pulley, wherein the first pulley applies a resistive force to the belt in response to the impeded rotation to impede translational motion of the peripheral motion assembly, and thereby impede translational motion of the peripheral.

77. The method of claim 73 wherein the coupling mechanism includes a bellows with a series of openings defined therein, and step (b.1) further includes:

(b.1.1) stabilizing the peripheral against buckling by receiving the peripheral within the openings to operatively couple the peripheral to the sensing assembly.

78. In an interface having a plurality of peripherals each selectively manipulable by a user and associated with a corresponding medical instrument and a plurality of sensing assemblies each associated with a corresponding peripheral for measuring manipulation of that peripheral, a method of enabling the user to interact with a simulation system via the interface to perform a medical procedure on a simulated anatomy of a virtual patient comprising the steps of:

(a) operatively coupling the peripherals to the corresponding sensing assemblies;

(b) measuring manipulation of each peripheral via the corresponding sensing assemblies; and

(c) transmitting information associated with the measured manipulation from the interface to the simulation system to enable the simulation system to simulate performance of the medical procedure with the associated medical instruments and exchange of the associated medical instruments during the medical procedure in accordance with manipulation of the peripherals.

79. In an interface having a peripheral selectively manipulable by a user and associated with a corresponding medical instrument, a sensing assembly to measure manipulation of the peripheral and a mock anatomical site having an orifice for receiving the peripheral and providing access to the

sensing assembly, a method of enabling the user to interact with a simulation system via the interface to perform a medical procedure on a simulated anatomy of a virtual patient comprising the steps of:

(a) operatively coupling the peripheral to the sensing assembly;

(b) selectively pivoting the mock anatomical site into a particular orientation to perform the medical procedure;

(c) measuring manipulation of the peripheral via the sensing assembly; and

(d) transmitting information associated with the measured manipulation from the interface to the simulation system to enable the simulation system to simulate performance of the medical procedure with the associated medical instrument in accordance with the peripheral manipulation.

80. In an interface having a peripheral selectively manipulable by a user and associated with a corresponding medical instrument, a sensing assembly to measure manipulation of the peripheral, a mock anatomical site having an orifice for receiving the peripheral, a block of resilient material disposed between the mock anatomical site and the sensing assembly and a guide tube to guide the peripheral within the interface, a method of enabling the user to interact with a simulation system via the interface to perform a medical procedure on a simulated anatomy of a virtual patient comprising the steps of:

(a) operatively coupling the peripheral to the sensing assembly;

(b) simulating forces and movement of the orifice encountered during performance of the medical procedure by forming a resilient passage within the interface for the peripheral to traverse, wherein step (b) further includes:

(b.1) forming the resilient passage by positioning the guide tube within the interface to extend from the orifice through the block toward the sensing assembly;

(c) measuring manipulation of the peripheral via the sensing assembly; and

(d) transmitting information associated with the measured manipulation from the interface to the simulation system to enable the simulation system to simulate performance of the medical procedure with the associated medical instrument in accordance with the peripheral manipulation.

81. In an interface for operatively interconnecting a peripheral to a simulation system to enable a user to interact with the simulation system to perform a medical procedure on a simulated anatomy of a virtual patient, wherein the interface includes a sensing assembly to measure manipulation of the peripheral and transmit information associated with the manipulation to the simulation system, a coupling mechanism to operatively couple the peripheral to the sensing assembly and a capture mechanism having a tubular member disposed between proximal and distal ends of the capture mechanism to engage the peripheral, a method of engaging the peripheral for interaction with the interface comprising the steps of:

(a) decreasing cross-sectional dimensions of the tubular member to engage the peripheral by expanding the tubular member in response to insertion of the peripheral within the interface; and

(b) increasing the tubular member cross-sectional dimensions to release the peripheral by compressing the tubular member in response to withdrawal of the peripheral from the interface.

82. In an interface for operatively interconnecting a peripheral to a simulation system to enable a user to interact with the simulation system to perform a medical procedure on a simulated

anatomy of a virtual patient, wherein the interface includes a sensing assembly to measure manipulation of the peripheral and transmit information associated with the manipulation to the simulation system, a coupling mechanism to operatively couple the peripheral to the sensing assembly and a capture mechanism including a peripheral interface having a plurality of jaws defined in a distal portion thereof to surround and engage the peripheral, a spring disposed over the peripheral interface to bias the jaws to a normally closed position, an expander to manipulate the jaws and a pivotable actuator to manipulate the expander to actuate the jaws to engage the peripheral, a method of engaging the peripheral for interaction with the interface comprising the step of:

(a) actuating the jaws to enter open and closed states for capturing and releasing the peripheral by manipulating the pivotable actuator to cause the expander to overcome the spring bias and control actuation of the jaws.

83. The method of claim 82 wherein the capture mechanism further includes an automatic capture and release mechanism to automatically capture and release the peripheral, and step (a) further includes:

(a.1) automatically capturing and releasing the peripheral via the automatic capture and release mechanism.

84. The method of claim 83 wherein the automatic capture and release mechanism includes a rod connected to the sensing assembly via a friction bracket, a pivotable bracket disposed on the sensing assembly proximate the rod, an actuator extension coupled to the pivotable actuator to

control actuation of the jaws, a support bracket disposed on the rod and a bracket spring disposed between the sensing assembly and pivotable bracket, and step (a.1) further includes:

(a.1.1) pivoting the pivotable bracket about the support bracket to manipulate the actuator extension relative to the support bracket to control actuation of the jaws in response to insertion and withdrawal of the peripheral within the interface apparatus;

(a.1.2) capturing the peripheral in response to the actuator extension being forced against the support bracket during insertion of the peripheral within the interface; and

(a.1.3) releasing the peripheral in response to the actuator extension being forced away from the support bracket during withdrawal of the peripheral from the interface.